SAN FRANCISCO FIRE DEPARTMENT

PROPOSED $ 63.27 MILLION BOND ISSUE
FOR THE IMPROVEMENT OF
FIRE PROTECTION FACILITIES & SYSTEMS

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Proposed $ 63.27 Million Bond Issue for the Improvement of Fire Protection Facilities & Systems

FOR SUBMITTAL TO THE ELECTORATE
OF THE CITY AND COUNTY OF SAN FRANCISCO

SAN FRANCISCO FIRE DEPARTMENT
DIVISION OF SUPPORT SERVICES
CITY AND COUNTY OF SAN FRANCISCO

MAY, 1997

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Proposed $63.27 million
bond issue for the
1997.

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I. EXECUTIVE SUMMARY

The strength of the San Francisco Fire Department is the reliability of its fire protection systems and the quality of its personnel. In addition to conventional systems, the Department has a unique collection of strategic tools which reinforce its fire fighting capabilities. The most important of these resources are the Department's fireboats and the Auxiliary Water Supply System (AWSS), a high pressure water system reserved exclusively for fire protection.

The AWSS was conceived following the 1906 Earthquake and is designed to protect the City from fire following a major seismic event. In recent years the system's aging pipes have experienced an increasing number of failures. Although it was within the system's design parameters, the 1989 Loma Prieta Earthquake resulted in twelve system breaches. By studying soil composition, pipe age, and other factors contributing to past problems, the Department has identified areas where potential future failures may occur. Addressing these conditions will now greatly increase the reliability of the system, and will minimize future costs in the event of a disaster.

Following the 1989 Quake, the fireboat 'Phoenix' was able to provide protection where AWSS lines were compromised in the Marina, but fireboat operations are also somewhat vulnerable to seismic activity. The fireboat crews are stationed at Pier 22½ where the fireboats are berthed. The pier and crew facilities were constructed in 1913. A recent structural assessment determined that both the building and pier must be strengthened to survive a major earthquake. The building is in poor repair after decades of continuous use and deferred maintenance, and must be renovated to provide accommodations for women firefighters, and current code requirements.

As the Navy turns over its military bases to the City, the Fire Department becomes responsible for fire protection in these areas. The existing Navy firehouses at Hunters Point, Treasure Island, and at Yerba Buena Island, built decades ago, do not meet current Seismic Code And Building Standards, or current Department firefighting and accomodation requirements. These existing firehouses must be renovated or replaced. Due to the extensive work required to renovate the firehouses at Hunters Point And Treasure Island, it is more economical to replace these buildings with new structures. To provide an emergency source of water from the Bay for fire protection near the waterfront of Hunters Point and to the South East area, a fireboat manifold will be installed near the new Hunters Point Fire Station.

The men and women who serve the Department are its most important resource. Constant training is necessary to protect the firefighters' safety and maintain their effectiveness in the field. In the 40 years since the Department's current training facilities were constructed, fire fighting methods have changed significantly. New programs and firefighting techniques have been added to prepare firefighters for a variety of emergency situations and to provide opportunities for professional advancement. The Fire Department's current facilities are not adequate to meet the demands of the Department's current programs, a new training complex is required to provide for the personal success and safety of Department personnel.

To protect the lives and property of San Francisco citizens, the Fire Department must have a well trained fire fighting force and reliable fire protection systems. Towards that end, the Department is requesting that a **$ 63,270,000** bond measure be submitted to the electorate. Funds from the measure will be used to construct two new fire stations at the former military bases, a new training complex, in addition to renovating a military fire station, Pier 22½ and the fireboat headquarters. Improvements must be made in the reliability of the Auxiliary Water Supply System. The proposed measure includes funds for construction, engineering, and program oversight:

Cost Breakdown	
Construction	$ 47,630,000
Geotechnical & Hazardous Materials Surveys	730,000
Planning & Design	5,696,000
Construction Management/Inspection/Testing	5,410,000
Regulatory Agency/Permit/Fees	598,000
Program Management	1,191,000
Fire Department Program Oversight	750,000
City Administrative Services	1,265,000
Total Bond Cost	**$ 63,270,000**

II. HISTORY OF THE S.F.F.D. AUXILIARY WATER SUPPLY SYSTEM

On the morning of April 18, 1906, a severe earthquake jolted California's central coast. The shock collapsed buildings and broke domestic water mains throughout San Francisco, leaving the Fire Department without water to fight the subsequent fires. For three days, uncontrolled fires raged through the City, destroying hundreds of buildings and leaving thousands homeless. As soon as the crisis had passed, Fire Department officials and civic leaders began devising strategies to protect the City from a similar conflagration. That planning process gave rise to the Fire Department's Auxiliary Water Supply System (AWSS), an entirely independent, high pressure water supply system dedicated to fire protection.

The first funding for the system was approved by the voters in 1908, and construction was completed in 1913. The original project set in place key system components and provided 72 miles of distribution pipes and 889 high pressure hydrants. Because the western and southern areas were

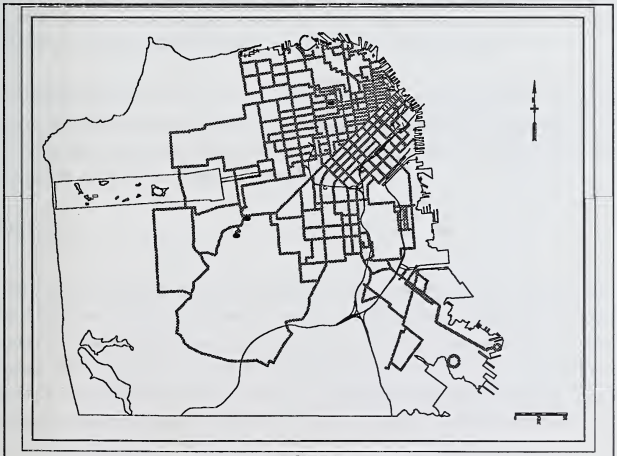

FIGURE 1
LOCATION OF FIREBOAT HEADQUARTERS, AWSS MAINS,
PROPOSED FIREBOAT MANIFOLD, AND TRAINING FACILITY

lightly developed rural districts, distribution lines were concentrated in the densely populated northeastern corner of the City. Water could be supplied to the system from Twin Peaks Reservoir, Ashbury Tank, Jones Street Tank, fireboats, and two emergency salt water pumping stations.

The system is still supplied by these original sources, but has been expanded to include 135 miles of distribution pipes and 1,600 hydrants. While the original design provided dense coverage in a small area, expansions in the 1930s, 1970s and 1980s attempted to provide service to the largest possible areas through the strategic placement of distribution mains.

III. AWSS REHABILITATION

SYSTEM CONSTRUCTION

The original AWSS lines were custom fabricated, heavy-duty cast iron pipes of 'bell and spigot' design. Each length of pipe flared to a larger diameter at one end. The next pipe segment was inserted into this 'bell.' The gap between the bell and spigot of the joint was filled with molten lead to seal the joint. Long wrought iron bolts, or tie-rods, were used to restrain pipe joints against the forces inherent to internal system pressures. As an additional safety measure, concrete thrust blocks were installed at pipe elbows, branches and dead ends to aid in resisting these forces.

These materials continued to be used until the 1960's when the cast iron pipes gave way to ductile iron pipes, and rubber gaskets replaced the lead seals. Ductile iron pipe is stronger and more resistant to corrosion, and the gasketed joints are more flexible than the earlier lead joints. Tie-rods are now fabricated from stainless steel instead of wrought iron.

CORROSION

In 1988 the Fire Department asked the Department of Public Works (DPW) to evaluate the condition of the AWSS network. SFFD crews excavating lines for repair or relocation had noted signs of corrosion including pitting, tubercles and graphitization. The Fire Department was concerned that the design strength of the system might have been compromised. DPW hired a consultant to assist in a study of pipe corrosion due to soil environments. Pipes were exposed for inspection, soil conditions were evaluated, and tests were made to detect factors that might accelerate corrosion.

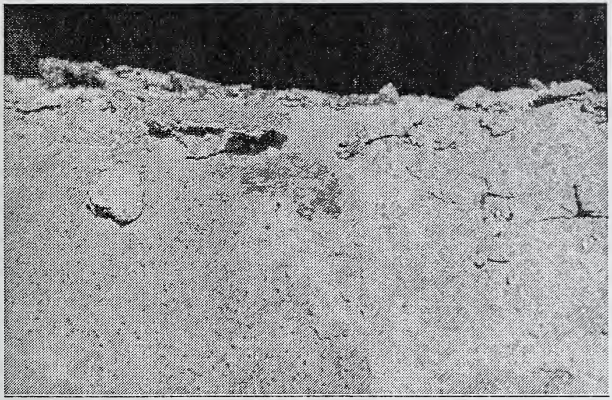

FIGURE 2
GRAPHITIZATION OF CAST IRON PIPE ON
WASHINGTON STREET BETWEEN DRUMM AND DAVIS STREET

Corrosion Of Pipes Inside Sewers

AWSS pipes inside sewer mains were the most severely corroded. Where the elevation of AWSS lines and sewer mains conflicted, some AWSS lines passed through the sewers rather than offsetting over or around them. SFFD records chronicle 98 locations where pipes passed through sewers. Given the hostile environment inside the sewers -- moisture, gasses, acids and salts -- the corrosion process has accelerated. Past pipe failures inside sewers heavily damaged the sewers, interrupting service and necessitating expensive repairs.

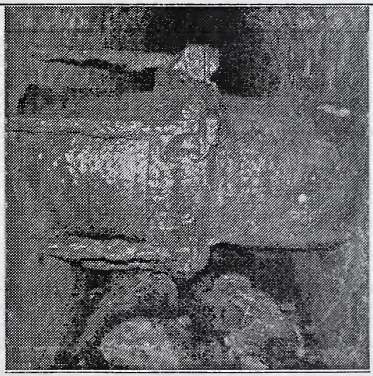

FIGURE 3
CORROSION OF CAST IRON PIPE INSIDE SEWER

Corrosion Of Tie-Rods

FIGURE 4
CORRODING BOLTS

Because the Department knows that wrought iron tie-rods are very susceptible to corrosion the Fire Department switched to corrosion resistant stainless steel. When pipes have been exposed for inspection, the wrought iron tie-rods were usually severely corroded and some failed completely. Because of their number and the critical function that they serve, tie-rod corrosion has proven to be a serious threat to the system integrity.

SETTLEMENT

Settlement In Infirm Areas

The 1988 study found that soil settlement was a contributing factor in many pipe failures. Several areas of the City were reclaimed by in-filling old creeks, marshes or shallow areas of the bay. Most of the fill material came from the sand dunes which covered much of the western side of the City. The sandy soils and underlying sediments in these reclaimed or "infirm" areas continually settled over time. On 7th Street, between Brannan and Townsend Streets, the roadway has been built up almost four feet to make up for settlement.

The settlement within an area was not always uniform. As sections of pipe settled at different rates, the joints have deflected. The soft lead joints in the system's oldest lines accommodated very little deflection without leaking or separating. When a lead filled joint was flexed, lead was forced out of the joint where the gap became smaller. If the deflection was extreme, there was insufficient lead remaining to properly seal the joint. Although it may not have failed completely, slow leaks did develop. Deflections could reverse under normal settlement conditions and may cycle during an

earthquake. Should the angle of deflection in a joint reverse, a lead joint would not re-seal. The Fire Department has estimated that the system would lose approximately 200,000 gallons of water each day through undetected leaks.

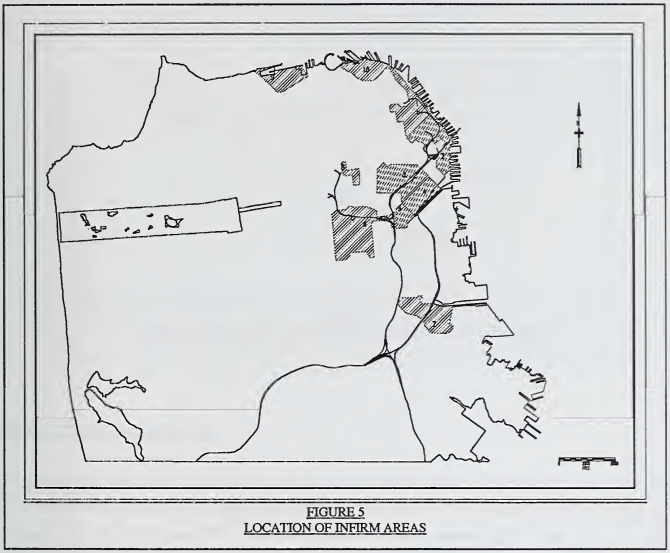

FIGURE 5
LOCATION OF INFIRM AREAS

New gasketed joints could tolerate deflections more than double those of lead joints and would not leak if the deflections reverse.

The potential for differential settlement was highest where lines moved from infirm areas into stable soils and where pipes crossed pile-supported sewers or other structures. Underground structures supported on piles would not settle. As the surrounding soil settled, the unsupported AWSS lines dropped until they rested on the supported structure. Further settlement could force the adjacent pipes to deflect. AWSS records identified 69 locations where pipes crossed pile supported sewers, and 65 locations where lines crossed the boundaries of infirm areas.

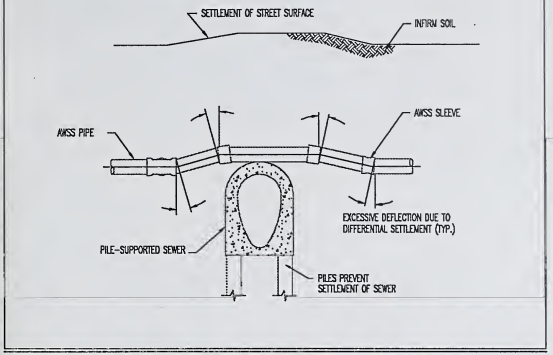

FIGURE 6
TYPICAL SETTLEMENT OF AWSS PIPE OVER PILE-SUPPORTED SEWER

Settlement During An Earthquake

Earthquakes can induce the rapid settlement of soils in infirm areas. Liquefaction can occur where fine, loose soils consolidate below the water table and behave as a fluid under the cyclic loading of the earthquake. In the 1989 Loma Prieta Earthquake, settlements in excess of 12 inches were recorded in the Sullivan Marsh (South of Market) area. Five pipe failures in that area rapidly drained the system's reservoirs. After the quake, consultants were engaged to evaluate the integrity of existing lines in the Marina district and the Sullivan Marsh area, the two infirm regions that had sustained the most damage. The study predicted that a major earthquake on the San Andreas fault would cause 11 failures in the Marina district and 84 AWSS breaks in the Sullivan Marsh area.

FIGURE 7
RUPTURED CAST IRON AWSS PIPE ON
WASHINGTON AND DAVIS STREET

GATE VALVES

The AWSS piping network includes numerous gate valves which can be used to regulate operating pressures and isolate damaged lines. The ability to rapidly open and close these valves is essential to provide appropriate flows and pressures and to preserve the integrity of the system in the event of a pipe failure. Historically, field crews were dispatched with truck-mounted actuators to operate the valves. This practice is time consuming and is limited by the availability of personnel and the number of valve operating apparatus, especially since the need to operate the valves always occurs when the demands upon Fire Department personnel are high.

The 1986 Fire Protection Bond provided funding to motorize 34 of the system's most critical valves with radio control. Many of the adjustments necessary to regulate water flows and quickly isolate vulnerable areas can now be made remotely. The AWSS Central Operations Center at Jones Street

FIGURE 8
MANUAL OPERATION OF AWSS VALVE

constantly monitors system pressures and the status of the remote control valves. These valve operators can also be controlled by the Department's Battalion Chiefs. The remote control feature reduces the system's dependence on field crews and allow system supervisors to simultaneously operate many valves. The valve operators are powered by battery, insulating the system from the effects of power failures that are common after an earthquake.

In April 1995, a pipe ruptured in an infirm area South of Market. In the past, such a failure would have caused extensive damage and significantly depleted the system's reservoirs before it could have been contained. By utilizing motorized valves, however, the failed line was isolated within minutes, minimizing damage and protecting the systems' water reserves.

PROPOSED AWSS IMPROVEMENTS

The AWSS improvements proposed in this bond will eliminate key points of vulnerability from the system. Lines will be rerouted to eliminate sewer penetrations, and flexible joints will be installed to allow differential settlement in pipes crossing pile-supported sewers and infirm area boundaries. The system's most deteriorated lines will be replaced including approximately 25 percent of the cast iron lines in the Marina District and the Sullivan Marsh areas. The installation of additional motorized

valve actuators will improve system operation and increase the Department's ability to contain pipe failures.

IV. HUNTERS POINT AWSS FIREBOAT MANIFOLD AND CONNECTION

Currently, the water supply for high pressure fire protection in the South East area comes from the North East portion of the city. In the event of earthquake damage in the North East or South of Market areas, the South East area could be left with an inadequate water supply for fire protection.

The Fire Department proposes to use funds from this bond to install a fireboat manifold at a pier in the Hunters Point Shipyard with a 10,000 foot AWSS pipeline connected to the existing AWSS piping network. In the event of a conflagration, the fireboat 'Guardian,' which will be berthed at the pier, could pump up to 24,000 gallons per minute of water from the Bay into the system. Additionally hydrants installed on the new pipeline will provide high pressure water fire protection to the adjacent areas.

The Fire Department will use funds from this bond to provide high pressure fire protection to the Hunters Point area, and improve the overall AWSS reliability for city-wide fire protection.

V. FIREBOAT HEADQUARTERS RETROFIT

GENERAL DESCRIPTION

Built in 1913, Pier 22½ serves as the home base for the Fire Department's two fireboats, the 'Guardian' and the 'Phoenix.' Situated on the waterfront between Harrison and Folsom Streets, the pier is centrally located to provide quick response to fires at either end of the City. A fireboat manifold at Pier 22½ allow the fireboats to inject bay water into the AWSS distribution network, supplementing the system's other supplies. The fireboat headquarters building, also built in 1913, located on the pier is staffed around the clock.

The fireboats are two of the most versatile tools available to the Fire Department in the aftermath of a major earthquake. Because the fireboats' movements will be unobstructed when roadways may be impassable. Several fireboat manifolds located along the waterfront allow the fireboats to pump water from the Bay into the system. In areas where pipelines fail, the fireboats can deliver water through temporary hose networks to fires located blocks away from the waterfront.

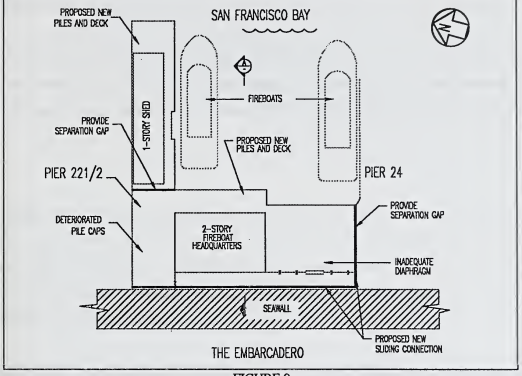

FIGURE 9
PLAN VIEW OF PIER 22½ AND THE FIREBOAT HEADQUARTERS

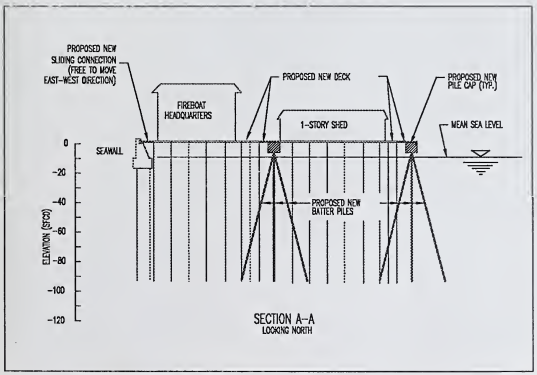

FIGURE 10
PROFILE VIEW OF PIER 22½ AND THE FIREBOAT HEADQUARTERS

Following the Loma Prieta Earthquake, the Marina fire was contained with water from the Phoenix's massive pumps.

Because of the fireboats' critical role in the Department's emergency planning, Pier 22½ and the headquarters are essential post-earthquake facilities. A recent structural assessment found, however, that both the pier and headquarters building would be heavily damaged in a major earthquake.

PIER 22½

Pier 22½ is constructed of wood planking over wood and steel beams and is supported by concrete and wood piles. The pier is connected to Pier 24 on the south by steel beams spanning between the two piers and is rigidly anchored to the Embarcadero seawall on the west. The seawall is a massive concrete structure supporting the Embarcadero roadway and preventing the in-filled soils of the Financial District from eroding into the bay.

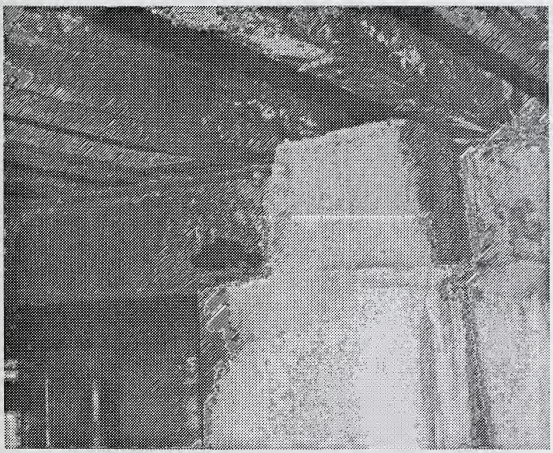

FIGURE 11
CORRODING PIER SUPPORTS

A recent examination showed that while the piles are in good condition, the framing of the pier is heavily corroded and has lost much of its strength. A structural evaluation reveals that in a major earthquake some piles can be crushed and the tops of piles can shift. The pier can further sustain damage by the adjacent seawall. As an independent structure, the pier can experience a maximum displacement of only 3 inches, but the seawall can shift up to 12 inches. Because of its mass, the movement of the seawall is unaffected by the resistance of the pier and can severely damage the pier's horizontal framing. When the above scenario occurs, the pier and fireboat headquarters building become unsafe for occupancy, and fireboat operations become compromised.

FIREBOAT HEADQUARTERS BUILDING

The two-story, 4,636 square foot, fireboat headquarters building includes offices, living quarters, a dormitory, and a parking bay for the fire engine stationed at the facility. The 84 year old, wood-framed building has numerous structural and architectural deficiencies. It is inadequately anchored to the pier and the framing of the first and second floors are not properly joined. In an earthquake, the building can slide up to a foot along the pier and seriously damage the structure and sever utility lines (including the gas line) that enter the house through the deck. The framing system can not withstand the lateral forces that are generated during a major earthquake.

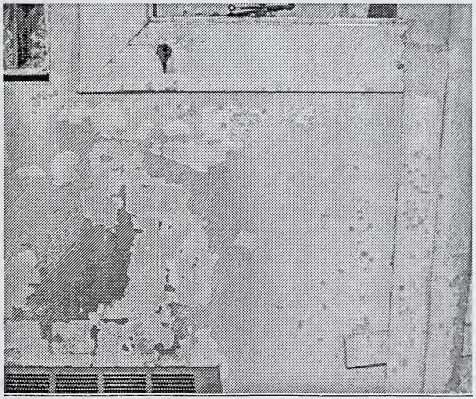

FIGURE 12
ASBESTOS AND LEAD HAZARDS

Like all Department facilities, the fireboat headquarters is under a Court mandate to provide separate sleeping accommodations and locker rooms for female firefighters, but the building also requires extensive architectural improvements. The roof needs to be replaced, and the plumbing, heating, and electrical systems are in poor repair. The system for exhausting the parking bay is inadequate, and fumes from the fire truck's diesel engines disperse throughout the building.

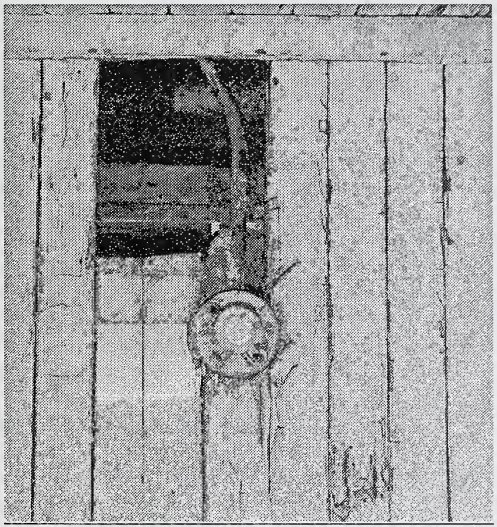

FIGURE 13
ROTTING WOOD BEAM AND CORRODING ELECTRICAL WIRING

PROPOSED UPGRADES

It is the intent of this bond measure to ensure that the pier and fireboat headquarters building will be capable of performing their essential, strategic roles following a major earthquake. Pier 22½ will be separated from Pier 24 and the seawall, allowing it to move independently, and the soil behind the seawall will be stabilized to reduce the movement of the wall. New batter piles will be added at the

east end of the pier, improving its resistance to seismic loads, and new pile caps and horizontal framing will distribute loads uniformly to all piles.

Strengthening the fireboat headquarters building will require the installation of tie-down bolts connecting the first and second floor frames and securing the building frame to the pier. Shear panels will be added to the roof and interior walls to resist lateral forces. In conjunction with the structural upgrades, bond moneys will fund accommodations for female firefighters and in addition to making needed architectural improvements.

VI. NAVAL BASE CONVERSION STATIONS

Hunters Point Shipyard, Treasure Island, and Yerba Buena Island are Navy installations at various stages of being turned over to the City. When the respective properties are acquired by the City, the San Francisco Fire Department will be responsible for protecting these areas in the event of a fire.

The existing fire houses are not adequate to support Fire Department operations. The structures do not have separate showers and locker facilities for male and female firefighters. The structures do not have public areas that offer disabled access. Asbestos containing materials were utilized in the construction, and extensive abatement would be a necessary part of the remodeling project. The electrical systems need to be upgraded, and the office areas have to be enlarged and completely remodeled to address the current codes.

HUNTERS POINT SHIPYARD STATION

The Hunters Point Shipyard fire station is a World War II-era two storied wood frame structure, with dormitory, shower, offices, and a parking bay for the stations engines.

The Hunters Point Shipyard fire station is not adequate to support Fire Department operations. Renovating the fire house for Department use is not economically feasible. The building shell does not have significant reuse value. The apparatus bay is not high enough to house standard Department firefighting apparatus, and requires extensive structural work in order to accommodate the firefighting apparatus. The building has inadequate lateral reinforcement and does not meet current seismic standards.

The Fire Department will utilize funds from this measure to build a new fire station to service the emerging industrial community.

TREASURE ISLAND STATION

Built in 1944, the existing Treasure Island fire station is a two-storied wooden frame structure, with recent improvements consisting of a new firewall between the apparatus bay, lounge and support offices, a central heating system, and additional office space.

The Treasure Island fire station is not adequate to support Fire Department operations. Renovating the house for Department use is not economically feasible. The apparatus bay is not high enough to house standard Department firefighting apparatus, and would require extensive structural work in order to accommodate the firefighting apparatus. Due to the constraints of the structural construction and architectural layout, the existing facility cannot meet current code requirements nor provide the functional needs of a modern firefighting facility.

The Fire Department plans to utilize funds from this measure to build a new fire station to service the island.

YERBA BUENA ISLAND STATION

Built in 1937, the art-deco Yerba Buena Station was originally a theater. The building is a single-story, reinforced concrete structure over a partial basement.

In this case, renovating the fire house for Department use is economically feasible. The renovation includes space for communications, lounge, kitchen, administrative offices, apparatus bays, separate shower and locker facilities for male and female firefighters, and public areas that offer disabled access.

The Fire Department plans to utilize funds from this measure to renovate the existing fire station.

VII. NEW FIRE SERVICE TRAINING CENTER

THE DIVISION OF TRAINING

The Division of Training is responsible for the Fire Department's numerous educational programs. The division trains new recruits, conducts in-service skills and management development programs, hosts State Fire Marshall and mutual aid training programs, and administers the Department's Neighborhood Emergency Response Team (NERT) program.

New recruits must complete a fourteen-week training program including classroom courses, physical conditioning, and skills exercises. Active firefighters undergo constant training. In addition to honing their fire fighting skills, they participate in Urban Search and Rescue (USAR) exercises, emergency medical training, confined space entry procedures, and classes on the identification and handling of hazardous materials. Other courses focus on human relations issues, providing skills for dealing with the public, helping firefighters to cope with their unique living and working environment, and preparing them to assume leadership positions within the Department. All of these activities are coordinated by the Division of Training and much of the instruction is done by division personnel.

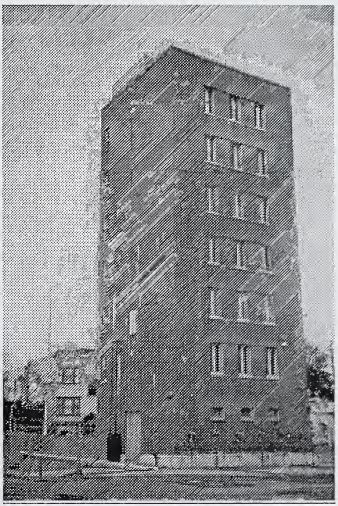

FIGURE 14
SFFD DRILL TOWER, CIRCA 1955

In addition to designing and scheduling programs for the Department's 1,512 personnel, the Division of Training acts as a liaison to outside training and mutual aid programs. In cooperation with other fire fighting districts and regional authorities, the division presents courses mandated by the State Fire Marshall's Office, hosts mutual aid coordination and training sessions, and arranges down-link sites for interactive, live-broadcast seminars.

The NERT program provides ordinary citizens with basic post-earthquake emergency response and survival information. With the foreknowledge that fire, police, and medical services will be stretched to the limit following a major earthquake, the courses encourage individual preparation and build community based teams capable of assisting one another and emergency services personnel. Courses are arranged in conjunction with neighborhood organizations, civic groups, employers, and major institutions. The curriculum teaches earthquake preparedness and includes basic triage, USAR, and fire extinguishing skills.

SFFD TRAINING FACILITIES

Constructed in 1955, the Training Division offices are housed in a 4,100 square foot facility that is inadequate for the Department's current needs. The training headquarters building has three small offices and only a single classroom. The portable buildings, built in 1984, provide additional office space and two small classrooms, but are not sufficient to house division personnel and support required courses. Emergency medical training and other programs must be held off site. Arranging classroom space and scheduling courses is a constant logistical nightmare.

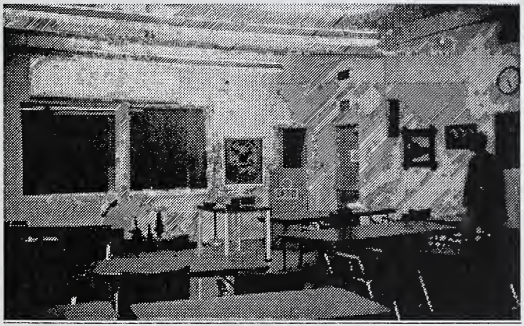

FIGURE 15
DIVISION OF TRAINING MAIN CLASSROOM

Since 1955, the hazards facing firefighters have been better defined, and new exercises have been devised to prepare firefighters for those dangers. The Department's tower and other practice structures cannot accommodate a full range of training exercises. The Department does not have a 'burn building' to safely train firefighters in interior fire suppression methods. The size of the drill yard limits the number and variety of exercises that can be performed simultaneously. Because it also

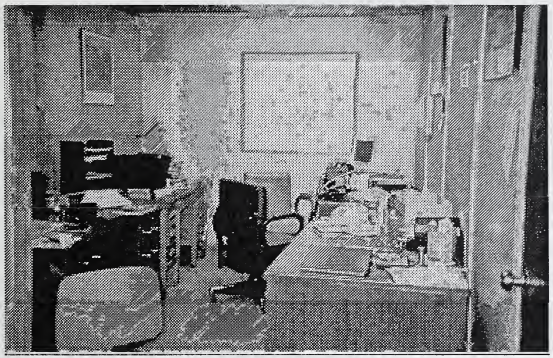

FIGURE 16
OFFICE SHARED BY FIRE SPECIAL PROGRAM OFFICERS

serves as the training center's parking area, the yard is not available for hose or engine drills when classes are scheduled.

Maintaining peak physical conditioning of the firefighters is critical to the fighting of major fires. The Department has no formal fitness facilities. There is a make-shift gym in the apparatus bay of a decommissioned fire house, but it does not provide the breadth of exercise opportunities which firefighters must have to remain in peak physical condition. The restrooms and heating system have not been operational since the building was moth-balled, the roof leaks, and there is no on-site parking. As a result, firefighters have pooled their own funds to purchase exercise equipment at almost every engine house.

PROPOSED FACILITIES

If the Division of Training is to fulfill its mission, the Fire Department must have facilities capable of supporting its programs. Existing resources are inadequate. Funds from this bond measure will be used to develop a new complex for Division of Training operations and state-of-the-art programs. The complex design is in accordance with National Fire Protection Agency (NFPA) standards for fire service training centers and will incorporate instructional, administrative and support functions on a site with sufficient space to stage training exercises.

The new facility will provide educational opportunities not currently available to the Department. Special simulation laboratories will test firefighters' reactions to fire and alarm scenarios, medical emergencies, and other crisis. An audio/visual lab library will house film and text references on fire sciences and professional development. More and larger classrooms will ensure that the division can provide courses when required and will make special programs available to larger groups of students. Outdoor training facilities will include a new drill tower and burn building, hazardous materials and confined space training areas, a drafting pit and driving course. Support facilities will include a conference area, storage space for training equipment and props, a fitness center, showers and locker rooms, and offices for Division of Training personnel.

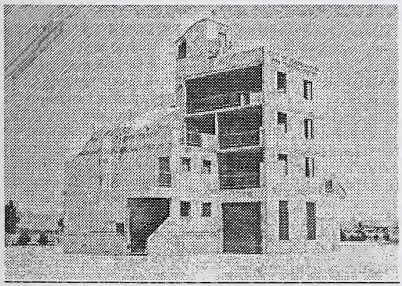

FIGURE 17
MODERN FIRE TRAINING STRUCTURE (PLEASANTON, CA)

The existing site will be unable to support the proposed complex. The Department hopes to utilize space at the former Hunters Point Naval Shipyard, but the master plan for the shipyard is still in the conceptual stage. The availability of room will depend upon other plans for the area. The final location of the new training complex will be determined by environmental review and site evaluation studies.

Another suitable site for the training center is at Treasure Island, which has been turned over to the City by the Navy. The final location of the new training complex will be determined by site evaluation studies.

VIII. PIPE YARD MAINTENANCE BUILDING

The Water Supply Division maintains the Department's water systems, repairing pipe failures, testing new installations, and refurbishing high and low pressure hydrants. The division operates out of the Department's materials storage yard on Jerrold Avenue. The pipe yard building serves as the division's offices, hydrant repair facility, and storage space. The wood framed structure is in poor repair. It lacks basic amenities and is not properly configured for the division's current operations.

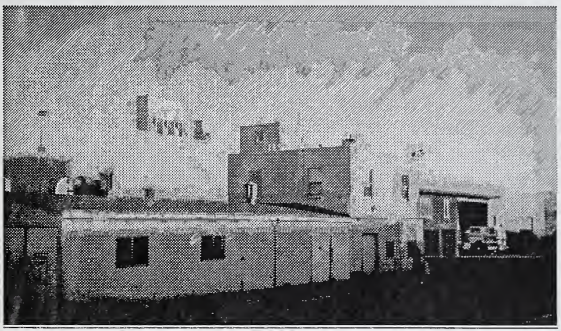

FIGURE 18
SFFD PIPE YARD BUILDING

Funds from this bond measure will be allocated to renovate the pipe yard offices.[1] The shop's concrete floor will be replaced, and the storage area will be reconfigured. Men's and women's bathrooms and locker facilities will be added. Lighting and windows will be replaced, and the building will be reroofed. The apparatus bay will be expanded to house the fuel truck stationed at the pipe yard.

[1] An engineering evaluation of the existing structure will determine if it can be economically renovated or if it must be replaced. Cost estimates assume replacement will be necessary.

IX. SUCTION CONNECTIONS

Lying between the Pacific Ocean and the Bay, San Francisco is virtually surrounded by water, providing unlimited reserves for fire fighting. To utilize these resources, the Fire Department installed 33 waterfront suction connections with funds from the 1986 Fire Protection Bond, mostly on the north and east sides of the City.

The suction connections are another tool in the Fire Department's strategic arsenal. Each suction connection consists of short piping system extending from a SFFD connection to an intake below the low tide level. When needed, pumper trucks can use the suction connections to draw water directly from the bay.

The suction connections have repeatedly demonstrated their value, particularly in combating large fires. The suction connection at China Basin played a significant role in the Department's efforts to control the June 1995 Recycling Center Fire. In infirm areas between the Marina and Hunters Point, the suction connections are an important back up to other systems that could be damaged in an earthquake. This measure will fund the installation of additional suction connections providing more complete protection to the City's waterfront areas.

X. BUDGET

CONSTRUCTION COST

Project	Construction Cost
AWSS Rehabilitation and Improvements	$ 20,200,000
Renovation and New Fire Stations and Facilities	$ 27,430,000
Total Construction Cost	**$ 47,630,000**

Total Bond Cost	
Construction	$ 47,630,000
Geotechnical & Hazardous Materials Surveys	730,000
Planning & Design	5,696,000
Construction Management/Inspection/Testing	5,410,000
Regulatory Agency/Permit/Fees	598,000
Program Management	1,191,000
Fire Department Program Oversight	750,000
City Administrative Services	1,265,000
Total Bond Cost	**$ 63,270,000**

XI. CONCLUSION

The Fire Department has determined that the following measures are imperative to preserve the integrity of its fire protection systems and provide adequate training programs for Department personnel:

(a) **Replacement of AWSS pipes in the sewers, over pile-supported sewers, and crossing infirm areas;**

(b) **Replacement of severely corroded cast-iron pipes;**

(c) **Installation of remote actuated, motorized valve operators;**

(d) **Installation of AWSS Fireboat Manifold and pipeline extending existing system into Hunters Point to improve system reliability and coverage;**

(e) **Stabilizing and strengthening of Pier 22½;**

(f) **Renovation of the fireboat headquarters;**

(g) **Construction of new fire stations at Hunters Point, Treasure Island, and renovation of existing Yerba Buena Island fire station;**

(h) **Construction of new training facilities;**

(i) **Renovation of the pipe yard maintenance building; and**

(j) **Installation of new suction connections.**

To fund these essential improvements, the Fire Department is requesting that a **$ 63,270,000 Bond Measure** be submitted to the electorate.